ADVANCED LIFE SUPPORT STUDY
fication 10; ECLSS Logistical Support Analysis f Space Station Freedom

Addendum to the Final Report

ADVANCED LIFE SUPPORT STUDY
Modification 10; ECLSS Logistical Support Analysis for Space Station Freedom

Addendum to the Final Report

Contract No.: NAS8-38781

Prepared for

Mr. Charles D. Ray
Structures and Dynamics Laboratory
Environmental Control and Life Support Branch
George C. Marshall Space Flight Center
Marshall Space Flight Center, AL 35812

APPROVED BY:
Jay M. Laue
STG Vice President,
Aerospace & Data Management
Directorate

APPROVED BY:
Harold L. Pastrick
Corporate Vice President
and General Manager
Systems Technology Group

FOREWORD

This addendum to the final report was prepared by SRS Technologies under contract NAS8-38781 for the George C. Marshall Space Flight Center (MSFC) of the National Aeronautics and Space Administration (NASA). The work was administered under the technical direction of the Contracting Officer's Technical Representative (COTR), Mr. Charles D. Ray of the Structures and Dynamics Laboratory, Environmental Control and Life Support Branch.

This report describes the work performed by SRS Technologies during the January 1992 through January 1993 time period. Mr. James C. Pearson, Jr. served as the SRS Project Leader. Other SRS personnel who made contributions to this effort include:

John Carroll
Joe Cody
Ken Noland
Deborah Kromis
Jay Laue
Steve Lee

1.0 SUMMARY OF WORK PERFORMED

A kickoff meeting was held on January 13, 1992 at MSFC. The tasks flow and descriptions were presented and discussed. Task activities were initiated. NASA attendees included: Kal Purushotham, Walt Wood, Larry Turner, Bob Erickson, and Steve Newton. SRS attendees included: Jay Laue, Ken Noland, Jim Pearson, and John Carroll.

John Carroll and Deborah Kromis attended the Automated Logistics System for Tracking, Analysis, and Reporting (ALSTAR) training course on January 21-23 at the Boeing Huntsville facility. They received certification as ALSTAR users as well as learning to use the DataExpress software, which is used to generate reports based on ALSTAR .

SRS received the SSF PDR design data package. A review of the data was initiated and surfaced issues in training and the maintenance concept. These issues were discussed with Kal Purushotham, who requested further investigation.

SRS studied the SSF PDR data package and identified the maintenance concept, structure, implementation plans, training plan, and the LSAR approach. Several concerns were identified and were reviewed. An independent approach which will alleviate the concerns was studied. Trade-off studies comparing the approaches and validating the independent approach may be required in the future. A draft report was provided to Mr. K. S. Purushotham, KA30, for a preliminary review in respect to logistics related interests.

SRS developed a "working capability" with ALSTAR and DATA EXPRESS software. Procedures were developed, using DATA EXPRESS, to retrieve information from the ALSTAR database on mean time between failure (MTBF), mean time to repair (MTTR), maintenance man hour (MMH), etc. for all LCNs (Logistic Control Numbers) and related tasks in reference to Lab Module A. This information was transferred, in RBase format, to a floppy disk to provide the option of performing analysis with the data at SRS facilities. It was found that there was limited data in the areas of concern (MTBF, MTTR, MMH, etc.) for Lab Module A.

The SSF maintenance concept was reviewed and a draft report of the findings was prepared. A copy of the draft report was given to NASA at a March 5 informal meeting at MSFC. Kal Purushotham, Jim Pearson, and Ken Noland of SRS were present.

An informal meeting was held at MSFC on March 12, 1992 with Kal Purushotham, KA30, Jim Pearson, Millard Jernigan, and Ken Noland attending. The status of the SSF Logistics program was discussed as well as SRS's support activities for KA30. The preliminary results of ALSTAR/LSAR evaluation were discussed and a meeting was planned between NASA, Boeing, and SRS in order to further discuss the status of the ALSTAR/LSAR data.

An informal meeting was held at MSFC on March 18, 1992. Kal Purushotham (KA30), Steve Taylor (Boeing), Jim Pearson, John Carroll, and Steve Lee of SRS were present. The

status of the ALSTAR/LSAR data was discussed. Boeing agreed to update the ALSTAR data by March 25, 1992 at which time SRS would review and evaluate the data. SRS was asked to support an MSFC internal LSAR Guidance Conference which was planned for late April or early May. In preparation for this meeting, SRS was instructed to obtain and review several documents including: SRD 0001, Revision D, SSP 30527, and LS-05. SRS's support for an upcoming (May 11) ILS panel meeting was also discussed.

SRS obtained and reviewed the previously mentioned documents in preparation for the upcoming LSAR Guidance Conference.

An informal meeting was held at SRS facilities on March 25, 1992. Kal Purushotham (KA30), Jim Pearson, Steve Lee, Jay Laue, and Millard Jernigan were present. The status of the SRS support was discussed. The draft report of the maintenance concept review, which was reported in the February 1992 monthly report, was discussed and potential candidates for maintenance concept trade-off studies were discussed. The SRS review of the documents to support the upcoming internal MSFC LSAR Guidance Conference was discussed.

The ALSTAR system was updated on March 25, 1992. SRS reviewed the LSAR data to determine if the required data was present in the ALSTAR system as defined by the LSAR data selection sheets, D683-10055-1, Issue C. We used the computer facilities at NASA to evaluate the LSAR Data Records B, B1, B2, C, D, and D1 for all Orbital Replacement Units (ORUs).

A formal report of our evaluation of the March 25 update of the ALSTAR database was presented to NASA on April 14. The LSAR Data Records B, B1, B2, C, D, and D1 were evaluated for all ORUs. In summary, the required data fields for some of the sheets were still missing.

In response to the initial evaluation of the March 25, 1992 update of the ALSTAR database, SRS was asked to evaluate some specific LCN in order to more thoroughly assess the completeness of the database. A formal report was presented on April 27, 1992. Our analysis was based on the LSAR data element definitions (DEDs) required by the LSAR Data Selection Sheets (DD Form 1949-1) as contained in D683-10055-1, Issue C dated January 9, 1992. We compared the data element requirements for LSAR Data Records B and C to the data elements currently resident in ALSTAR. The four LSA Control Numbers (LCNs) which were selected for review (SACKGB, SAFKGB, SAPKGB, and SASKGB) are those of the fans in the Environmental Control and Life Support System (ECLSS) laboratory module. Our analysis indicates that many of the required DEDs have been entered in ALSTAR; however, some DEDs were totally blank and others contained suspect entries such as zero filling and inconsistencies with other DEDs. DED 218, Maximum Time to Repair, needs to be reviewed and updated as it relates to DED 241, Mean Time to Repair. DED 106, End Item Acronym Code, is required from Level II. Some of the missing data elements (such as DED 099, Drawing Number; DED 411, Serial Number Effectivity; etc.) may not yet be developed and/or applicable. Other data elements (such as DED

195, Logistic Considerations; DED 153, Sensitive Item; etc.) likely should be available and included in ALSTAR.

In preparation for the LSAR Guidance Conference, SRS reviewed several pertinent documents including SS-SRD-0001D, Section 3.0 and Section 4.0 Space Station Freedom Program Definitions and Requirements, D683-10220-1 Critical Items List, SSP 30566 Integrated Logistics Support Function Control Document, and D683-10055-1 Integrated Logistics Support Plan Attachment A: Logistics Analysis Plan Issue C. Steve Lee of SRS participated in the conference at the Boeing facilities on April 28-29, 1992. At the conference, the following documents were reviewed: LSA-060 LCN Masterfile (DR LS04), LSA-015 Sequential Task Description (DR LS04), LSA-061 Parts Masterfile (DR LS04), LSA-009 Support Items List (DR LS08 D683-10519-1), and LSA-024 Maintenance Plan (DR LS01).

As a follow-up to the April 27, 1992 formal report, on May 20, 1992, SRS reviewed the four LSA Control Numbers (LCNs) which were previously selected for review (SACKGB, SAFKGB, SAPKGB, and SASKGB) to see if any updates were made. We determined that the only data element added since April 27 was Task Frequency on C records .

An informal status meeting was held on May 27 , 1992 at MSFC. Kal Purushotham, Jim Pearson, Steve Lee, and Deborah Kromis were present. At the meeting, SRS informed NASA that we were unable to gain access to the LSA reports LSA-060 LCN Masterfile Report, LSA-015 Sequential Task Summary, and LSA-061 Parts Masterfile through ALSTAR.

The ALSTAR system was queried early in June to assess Boeing's data entry status. A verbal report was given to Kal Purushotham at an informal meeting. Deborah Kromis attended the WP01 LSAR Review Two at the Boeing facility on July 28-30, 1992. Tasking and expenditures during the months of June and July 1992 were reduced at the request of MSFC. At the request of the customer, tasking and expenditures on the total effort were significantly reduced following the August 1992 meeting through the duration of the contract, January 30, 1993.

A summary of the significant events which occurred during this effort is provided in Exhibit 1.

2.0 PROBLEMS

No significant problems were encountered during the duration of the contracted effort.

3.0 SCHEDULE STATUS

Work progressed on schedule for the duration of the contracted effort.

4.0 RESOURCE STATUS

Total Contract Value: $359,073*

Total Contract Cost (ending 1/30/93): $329,376.97 *

* excluding fee

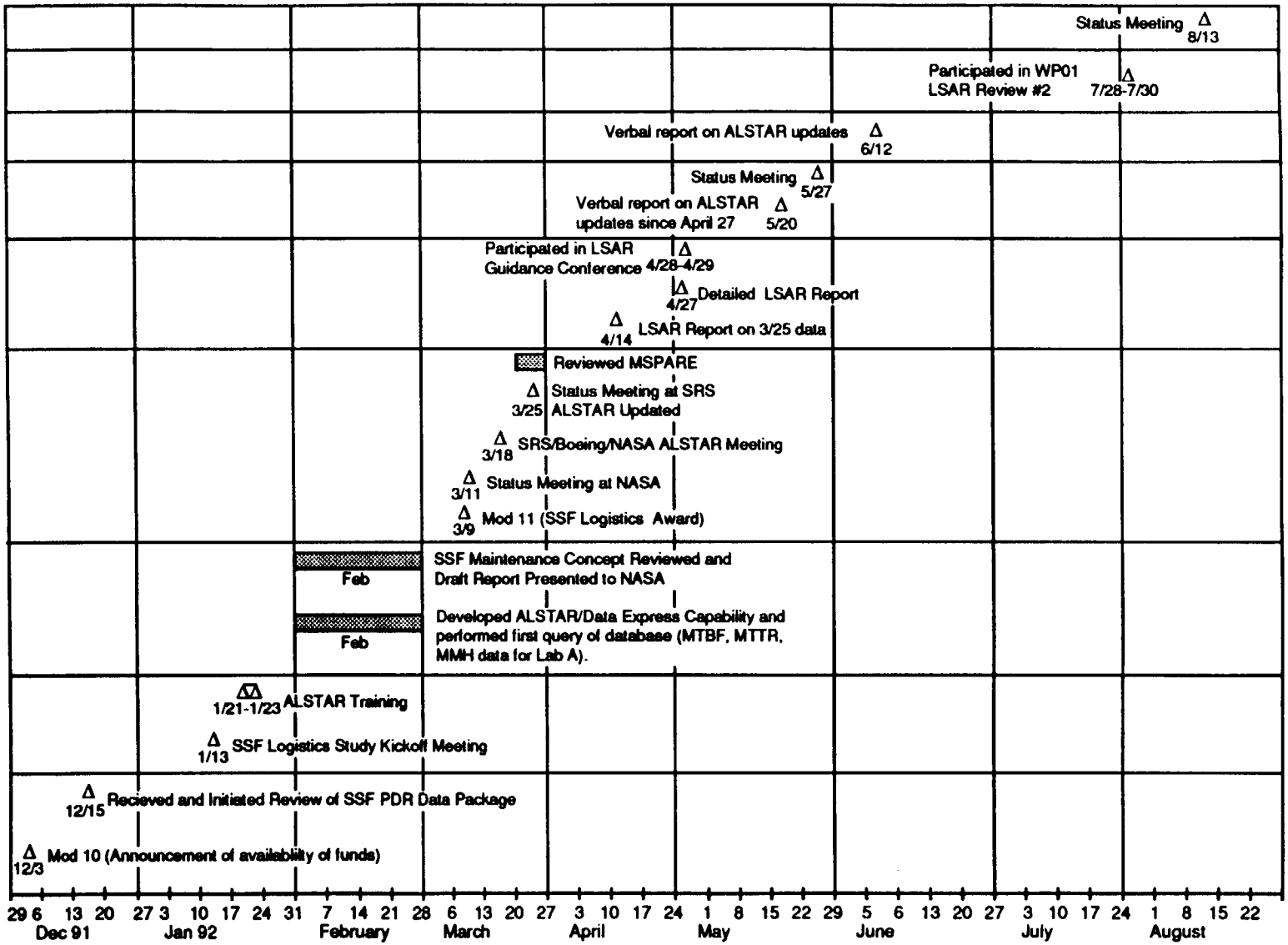

Exhibit 1 Summary of Significant Events

SYSTEMS TECHNOLOGY GROUP

SRS TECHNOLOGIES

January 30, 1993
SRS/STG-PR93-5738/17

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SUBJECT: Addendum to the Final Report - Advanced Life Support Study, Modification 10; ECLSS Logistical Support Analysis for Space Station Freedom

PREPARED FOR: Mr. Charles D. Ray/ED62
Structures and Dynamics Laboratory
Environmental Control & Life Support Branch
George C. Marshall Space Flight Center
Marshall Space Flight Center, AL 35812

CONTRACT NO.: NASA Contract NAS8-38781

DATE OF PUBLICATION: January 30, 1993

The enclosed Addendum to the Final Report provides a description of the work performed under the subject contract.

Sincerely,

SRS TECHNOLOGIES
Systems Technology Group

James C Pearson, Jr.

James C. Pearson, Jr.
Project Leader

JCP/aw

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